What is claimed is:

1. A sensor for detecting a change in a parameter, the sensor comprising:

a transducer including at least two electrodes in electrical communication with an electroactive polymer, the transducer configured such that a portion of the electroactive polymer deflects in response to the change in the parameter and the portion deflection produces an electrical change in the transducer; and

sensing electronics in electrical communication with the at least two electrodes and designed or configured to detect the electrical change.

2. The sensor of claim 1 further comprising a logic device in electrical communication with the sensing electronics, the logic device configured to quantify the portion deflection using the electrical change received by the sensing electronics.

3. The sensor of claim 2 wherein the logic device is further configured to quantify the change in the parameter.

4. The sensor of claim 1 wherein the portion deflection produces an electrical impedance change in the transducer.

5. The sensor of claim 1 wherein the portion deflection produces a capacitance change in the transducer.

6. The sensor of claim 1 wherein the portion deflection produces a resistance change in the transducer.

7. The sensor of claim 1 further comprising a coupling mechanism that is designed to configured to receive input energy associated with the change in the parameter and transfer a portion of the input energy to the electroactive polymer.

8. The sensor of claim 7 wherein the coupling mechanism comprises a stiff member attached to the polymer and mechanically coupled to an object that produces the input energy associated with the change in the parameter.

9. The sensor of claim 7 wherein the coupling mechanism is a conductor in electrical communication with the transducer, the conductor providing electrical communication between the transducer and an object that produces a change in an electrical property.

10. The sensor of claim 9 wherein the portion deflection is produced as a result of a change in one of current, voltage, and resistance of the object.

11. The sensor of claim 1 wherein the transducer is configured to measure mechanical defection of an object that the transducer is mechanically coupled to.

12. The sensor of claim 11 wherein the mechanical defection is a result of at least one of strain, pressure, and temperature.

13. The sensor of claim 1 wherein the change in the parameter comprises a change in a physical property of the polymer.

14. The sensor of claim 13 wherein the change in the physical property of the polymer is the size of the polymer.

15. The sensor of claim 1 wherein the transducer is a monolithic transducer.

16. The sensor of claim 1 wherein the electroactive polymer is a dielectric elastomer.

17. The sensor of claim 1 wherein one or more of the at least two electrodes is compliant.

18. The sensor of claim 17 wherein the at least two electrodes comprise one of a colloidal suspension, a conductive grease, and a mixture of ionically conductive materials, a textured electrode, a high aspect ratio carbon material, and a conductive polymer.

19. The sensor of claim 1 further comprising a resistor that controls rate of charge moved to and from the polymer.

20. The sensor of claim 1 further comprising a voltage source in electrical communication with the at least two electrodes and configured to apply a voltage to the at least two electrodes.

21. The sensor of claim 1 wherein the sensing electronics communicate with the at least two electrodes using a wireless communication.

22. The sensor of claim 1 wherein the electroactive polymer is pre-strained.

23. A method of using an electroactive polymer transducer which comprises at least two electrodes in electrical communication with an electroactive polymer, the method comprising:

applying a voltage difference between the at least two electrodes;

deflecting the electroactive polymer from a first position to a second position; and

detecting an electrical change in the transducer resulting from the deflection from the first position to the second position.

24 The method of claim 23 further comprising quantitatively converting the electrical change to the deflection from the first position to the second position.

25. The method of claim 23 wherein the voltage applied between the at least two electrodes is less than the voltage required to actuate the electroactive polymer from the first position to the second position.

26. The method of claim 23 further comprising removing charge from the at least two electrodes during the deflection from the first position to the second position.

27. The method of claim 23 wherein the deflection from the first position to the second position is associated with a change in a parameter of an object that the transducer is coupled to.

28. The method of claim 27 further comprising quantitatively converting the electrical change to the change in the parameter.

29. The method of claim 27 wherein the parameter is a mechanical property of the object.

30. The method of claim 23 further comprising controlling rate of moving charge to and from the polymer.

31. The method of claim 23 wherein the voltage applied between the at least two electrodes is an AC voltage.

32. The method of claim 31 wherein the voltage applied between the at least two electrodes is between about 1 mV and about 10,000 V.

33. The method of claim 23 wherein detecting the electrical change comprises detecting one of a capacitance change and a resistance change in the transducer.

34. The method of claim 23 further including pre-straining the polymer before applying the voltage.

35. The method of claim 23 wherein the electroactive polymer is a dielectric elastomer.

36. The method of claim 23 wherein detecting the electrical change comprises transmitting the electrical change to sensing electronics in electrical communication with the at least two electrodes.

37. The method of claim 36 wherein the sensing electronics detect a resistance change in one of the at least two electrodes.

38. The method of claim 23 wherein the sensing electronics detect a resistance change in the polymer resulting from the deflection.

39. The method of claim 38 wherein the sensing electronics detect a capacitance change in the polymer.

40. The method of claim 23 further comprising removing charge from the at least two electrodes during deflection from the first position to the second position.

41. A sensor for detecting a change in a parameter, the sensor comprising:

a transducer including at least two electrodes in electrical communication with an electroactive polymer, the transducer configured such that a portion of the electroactive polymer deflects in response to the change in the parameter and the portion deflection produces a capacitance change in the transducer; and

sensing electronics in electrical communication with the at least two electrodes and designed or configured to detect the capacitance change.

42. The sensor of claim 41 wherein the capacitance change is produced in the electroactive polymer.

43. The sensor of claim 41 wherein the at least two electrodes have a resistance approximately less than about 10% of the electroactive polymer resistance.

44. The sensor of claim 41 further comprising a voltage source in electrical communication with the at least two electrodes and configured to apply a voltage to the at least two electrodes.

45. The sensor of claim 41 wherein the sensing electronics are configured to operate in an AC mode.

46. The sensor of claim 41 further comprising a logic device in electrical communication with the sensing electronics, the logic device configured to quantify the portion deflection using the electrical change received by the sensing electronics.

47. The sensor of claim 41 wherein the sensing electronics comprise a high resistance resistor in series with the at least two electrodes.

48. The sensor of claim 41 wherein one of the at least two electrodes is compliant.

49. A sensor for detecting a change in a parameter, the sensor comprising:

a transducer including at least two electrodes in electrical communication with an electroactive polymer, the transducer configured such that a portion of the electroactive polymer deflects in response to the change in the parameter and the portion deflection produces a resistance change in the transducer; and

sensing electronics in electrical communication with the at least two electrodes and designed or configured to detect the resistance change.

50. The sensor of claim 49 wherein the portion deflection produces a resistance change in one of the at least two electrodes.

51. The sensor of claim 49 wherein the portion deflection produces a resistance change in the electroactive polymer resulting from the deflection.

52. The sensor of claim 51 wherein the at least two electrodes have a conductance greater than the electroactive polymer.

53. The sensor of claim 49 further comprising a voltage source in electrical communication with the at least two electrodes configured to apply a voltage to the at least two electrodes.

54. The sensor of claim 49 further comprising a resistor that controls rate of moving charge to and from the polymer.

55. The sensor of claim 54 wherein the resistor produces an RC time constant with the polymer that is at least faster than the rate of change of the parameter being measured.

56. The sensor of claim 49 wherein the sensing electronics detect a voltage change in response to the resistance change in the transducer.

57. The sensor of claim 56 further comprising a logic device in electrical communication with the sensing electronics, the logic device configured to quantify the portion deflection using the voltage change received by the sensing electronics.

58. The sensor of claim 56 wherein the sensing electronics operate in a DC mode.

59. The sensor of claim 49 wherein one of the at least two electrodes is compliant.

60. A sensor for detecting a change in a parameter, the sensor comprising:

a transducer including at least two electrodes in electrical communication with an electroactive polymer, the transducer configured such that a portion of the electroactive

polymer deflects in response to the change in the parameter and the portion deflection produces a resistance change in the electroactive polymer; and

sensing electronics in electrical communication with the at least two electrodes and designed or configured to detect the resistance change.

61. The sensor of claim 60 wherein the at least two electrodes have a conductance greater than the electroactive polymer.

62. The sensor of claim 60 wherein the sensing electronics communicate with the at least two electrodes using a wireless communication.

63. The sensor of claim 60 further comprising a voltage source in communication with the at least two electrodes and configured to apply a voltage to the at least two electrodes.

64. The sensor of claim 60 wherein the voltage source provides a high frequency AC signal.

65. The sensor of claim 60 further comprising a logic device in electrical communication with the sensing electronics, the logic device configured to quantify the portion deflection using the electrical change received by the sensing electronics.

66. The sensor of claim 60 wherein one of the at least two electrodes is compliant.

67. The sensor of claim 60 wherein the electroactive polymer is a dielectric elastomer.

68. The sensor of claim 60 further comprising a coupling mechanism that is designed or configured to receive input energy associated with the change in the parameter and transfer a portion of the input energy to the electroactive polymer.

69. A sensor for detecting a change in a parameter, the sensor comprising:

a transducer including at least two electrodes in electrical communication with an electroactive polymer, the transducer configured such that a portion of the electroactive

polymer deflects in response to the change in the parameter and the portion deflection produces a resistance change in one of the at least two electrodes; and

sensing electronics in electrical communication with the at least two electrodes and designed or configured to detect the resistance change.

70. The sensor of claim 69 wherein the one of at least two electrodes comprise carbon fibrils.

71. The sensor of claim 70 wherein the at least two electrodes comprise one of a colloidal suspension, a conductive grease, a mixture of ionically conductive materials, a textured electrode, a high aspect ratio carbon material, and a conductive polymer.

72. The sensor of claim 69 further comprising a voltage source in communication with the at least two electrodes configured to apply a voltage to the at least two electrodes.

73. The sensor of claim 69 wherein the voltage source provides a high frequency AC signal.

74. The sensor of claim 69 wherein one of the at least two electrodes is compliant.

75. A sensor for detecting a change in a parameter, the sensor comprising:

a transducer including at least two electrodes in electrical communication with an electroactive polymer, the transducer configured such that a portion of the electroactive polymer deflects in response to the change in the parameter and the portion deflection produces an impedance change in the transducer; and

sensing electronics in electrical communication with the at least two electrodes and designed or configured to detect the impedance change.

76. The sensor of claim 75 wherein the impedance change comprises a resistance change in the electroactive polymer.

77. The sensor of claim 75 wherein the impedance change comprises a resistance change in one of the at least two electrodes.

78. The sensor of claim 75 wherein the impedance change comprises a capacitance change in the electroactive polymer.

79. The sensor of claim 75 further comprising a voltage source in electrical communication with the at least two electrodes configured to apply a voltage to the at least two electrodes.

80. The sensor of claim 75 wherein the sensing electronics detect a voltage change in response to the resistance change in the transducer.

81. The sensor of claim 75 wherein the electroactive polymer is a dielectric elastomer.

82. The sensor of claim 75 wherein one of the at least two electrodes is compliant.

83. A sensor array for detecting a change in one or more parameters, the sensor array comprising:

at least one transducer comprising,

at least two electrodes coupled to a first portion of at least one electroactive polymer, the at least one transducer configured such that the first portion deflects in response to a first change in the one or more parameters and the first portion deflection produces a first electrical change in the at least one transducer;

at least two electrodes coupled to a second portion of the at least one electroactive polymer, the at least one transducer configured such that the second portion deflects in response to a second change in the one or more parameters and the second portion deflection produces a second electrical change in the at least one transducer; and

sensing electronics in electrical communication with the at least two electrodes coupled to the first portion and in electrical communication with the at least two electrodes coupled to the second portion, the sensing electronics designed or configured to detect the first and second electrical change.

84. The sensor array of claim 83 wherein the at least one electroactive polymer is a monolithic electroactive polymer and the first portion and the second portion are both portions of the monolithic polymer.

85. The sensor array of claim 83 wherein the first portion of the at least one electroactive polymer responds to the first change independently to response of the second portion to the second change.86. The sensor array of claim 83 further comprising a logic device in electrical communication with the sensing electronics, the logic device configured to quantify the first and second change using the electrical change received by the sensing electronics.

87. The sensor array of claim 83 further comprising a coupling mechanism that is designed to configured to receive input energy associated with the first change in the one or more parameters and transfer a portion of the input energy to the at least one electroactive polymer.

88. The sensor array of claim 83 wherein the at least one transducer is configured to measure mechanical defection of an object that the transducer is mechanically coupled to.

89. The sensor array of claim 83 wherein the array comprises two transducers, and the first portion is included in a first electroactive polymer of the first transducer and the second portion is included in a second electroactive polymer of the second transducer.

90. The sensor array of claim 83 wherein the sensing electronics are configured to provide electrical energy to the at least two electrodes coupled to the first portion without providing electrical energy to the at least two electrodes coupled to the second portion.

91. The sensor array of claim 83 wherein the portion deflection produces a capacitance change in the transducer.